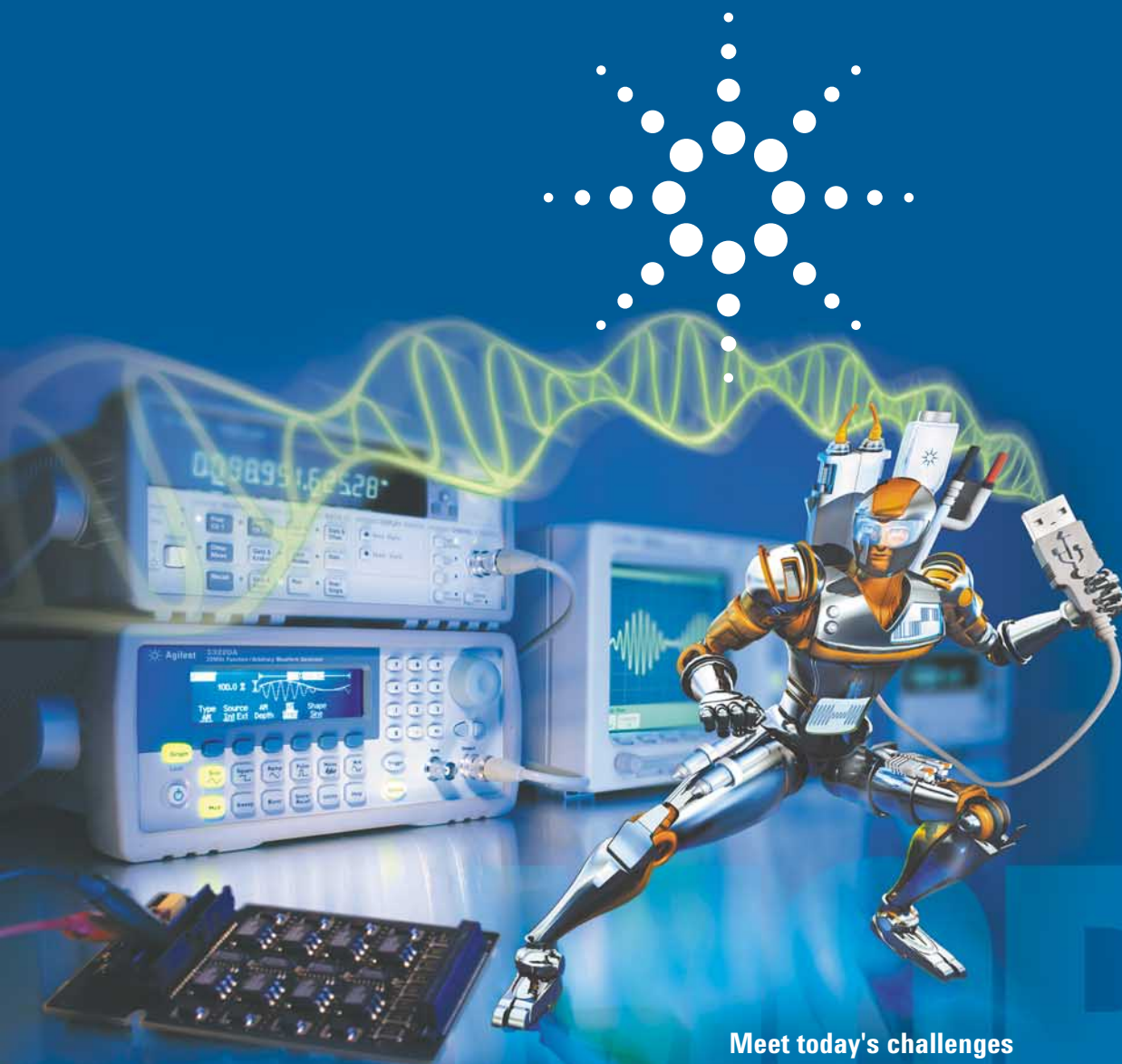


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See page 3

Basic Instruments

Selection Guide:

Product and solution summaries
from Agilent's Web



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with more capability
and more performance



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Use the online side-by-side product comparison to quickly narrow the possibilities

Most Agilent product families offer a range of models, each designed with a particular balance of price, performance and capabilities. To find the best candidates for your needs, you can quickly compare up to four products side-by-side, filter selections based on performance and features, or let the Product Advisor tool suggest some good possibilities.

Compare products side-by-side
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test and measurement challenges.

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United States Home > Products & Services > Test & Measurement > ... > Function / Arbitrary Waveform Generators

Function / Pulse Generators

Agilent Direct: Side-by-Side Product Comparison

Product:	33220A 20 MHz Function/Arbitrary Waveform Generator	33250A Function/Arbitrary Waveform Generator, 80 MHz
Description:	The Agilent 33220A function/arbitrary waveform generator uses direct digital-synthesis techniques to create a stable, accurate output signal for clean, low-distortion sine waves. » Download Product Data Sheet » View Available App Notes US\$ 1,980.35 (4 weeks)	The Agilent 33250A delivers nearly double the performance of any other function arbitrary waveform generator in its price class. » Download Product Data Sheet » View Available App Notes US\$ 4,591.58 (4 weeks)
Configuration Price & Delivery:	E-mail me a Quick Quote	E-mail me a Quick Quote
Key Features:	Generates arbitrary and standard waveforms including sine, square, pulses, triangle, ramp and noise 20 MHz maximum frequency for sine and square waves	Generates arbitrary and standard waveforms including sine, square, pulses, triangle, ramp and noise 80 MHz maximum frequency for sine and square waves, 50 MHz for pulses, 25 MHz for arbitrary waveforms
Additional Capabilities:	Additional waveforms AM, FM, PM, FSK and PWM modulation; Linear & logarithmic sweeps and burst operation modes User interface Graphical display that shows multiple waveform parameters at the same time Connectivity USB, GP-IB and LAN interfaces; Agilent IntuiLink software including IntuiLink Arbitrary Waveform Editor	Additional waveforms AM, FM, and FSK modulation; Programmable burst count with gating; Linear and Log sweep User interface Color graphical display that shows multiple waveform parameters at the same time Connectivity GP-IB interface; Agilent IntuiLink software including IntuiLink Arbitrary Waveform Editor
Related Products:	33220A-001 10 MHz TCXO timebase/phase-lock option	34190A Rackmount kit for 34401A, 33120/250A, 53131A, 34970A, etc.

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Please quote the Agilent Quotation No. QQ31135 when calling

QUOTATION			
Quotation No.	Date	Page Number	
QQ31135	28 Jun 2004	1 of 6	
Expiration Date	Delivery Terms	Payment Terms	
27 Aug 2004	DDP - Duty Paid	Net 30 days	

Agilent Technologies Inc. /US
PO BOX 4026
Englewood, CO
80155-4026 United States

Item No.	Product / Description	Est.(weeks) Availability	Qty	Unit Price
1	33220A 20 MHz Function/Arbitrary Waveform Generator	7	1	1,853
2	R-51B-001-3C 1 year Return-to-Agilent warranty extended to 3 years	2	1	122
3	33220A-603 Power cord - United States and Canada (120V)	2	1	0
4	33220A-ABA English - English manual set	2	1	0

The above quote item is a standard configured product. The product can be customized and configured to contain the following options

Step 1: Check the box next to the options if you require the option.
Step 2: Add option prices to A) Quote Net Total to obtain B) Revised Quote Net Total

Options / Description	Est.(weeks) Availability	Qty	Unit Price
33220A-001 10 MHz TCXO timebase/phase-lock option	7		431
33220A-1CM RACKMOUNT KIT	2		54
82357A USB/GPIB Interface Converter to control GPIB Instruments over USB	3		518
54622D 2+16-Channel 100-MHz MegaZoom Oscilloscope	3		1,137
W1140A-TK1 T and M Programmers Toolkit software with 6 months included support	4		5,352
R-50C-011-3 Inclusive Calibration Upfront Plan 3 year coverage	4		696
R-50C-013-3 Inclusive Plus Calibration Upfront Plan 3 year coverage	2		1,495
R-51B-001-5F 3 year Return-to-Agilent warranty extended to 5 years	2		405
	2		487
	2		529

A) Quote Net Total US\$ 1,975

B) Revised Quote Net Total (including Options)

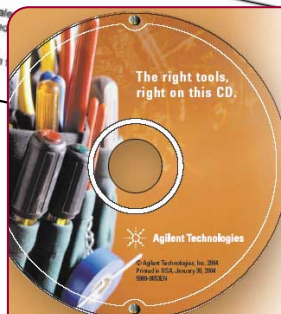
NOTE:
Prices are Agilent List Price before tax. Prices exclude any sales tax. All prices are firm.
Agilent Technologies as the vendor, be forwarded.
Agilent terms, subject to credit approval. All prices are firm.

STEP 2

Accelerate your decision with Agilent Direct Quick Quotes

Whenever you see "Get a Quick Quote" next to a product description online, simply click that link, enter some basic information, and we'll e-mail you a firm, legal quote within two minutes. Quick Quote provides cost information on the typical configuration for over 400 of Agilent's most popular products, along with prices for additional options and accessories to simplify your selection.

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Make the most of the tools you use every day, from scopes to function generators to test software. This free CD is packed with product info, application notes, and video demos.

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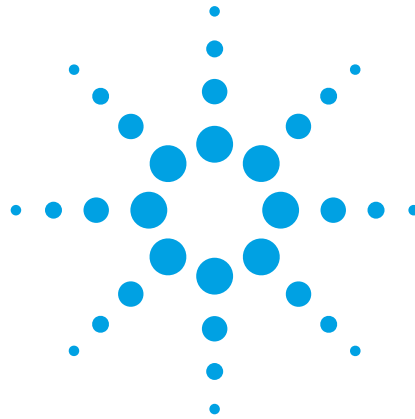


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Agilent 6000 Series Oscilloscopes

The new Agilent 6000 Series oscilloscopes deliver more powerful features and higher performance than any scopes in their performance class.



Agilent Technologies

Agilent scopes surpass all other scopes

Do you really want to start tomorrow's project with yesterday's oscilloscope technology on your bench? Here are SIX reasons to think twice about your first choice for a new scope:

1. **More bandwidth**—up to 1 GHz
2. **More channels**—up to 20 time-aligned scope and logic channels in one instrument
3. **More memory**—up to 800 times more than the Tektronix TDS3000B Series
4. **More triggering**—powerful serial and mixed-signal triggering across all channels
5. **More display**—XGA color display with 100,000 waveforms/second update rate and 256 levels of intensity grades
6. **More connectivity choices**—LAN, USB, GPIB and XGA video are all included standard

	Agilent 6000 Series*	Tektronix TDS3000B Series**
Bandwidth	Up to 1 GHz	Up to 600 MHz
Channels	2, 4, 2+16, 4+16	2, 4
Maximum sample rate	Up to 4 GSa/s	Up to 5 GSa/s
Maximum memory	1 Mpts standard, up to 8 Mpts optional	10 K
Display resolution	XGA (1024x768) color with 256 levels of intensity grades	VGA (640x480) color with 16 levels of intensity grades
Waveform update rate	100,000 waveforms/second	3,600 waveforms/second
Connectivity	Standard: LAN, USB, GPIB, & XGA video	Standard: LAN and parallel (GPIB, RS-232 and video are optional)

* Agilent 6000 Series Oscilloscopes Data Sheet, Pub. No. 5989-2000EN, Jan. 21, 2005
 ** Tektronix TDS3000B User Manual 071-0957-02, Oct. 4, 2004

Rock-solid performance:

The power to bring your toughest problems into focus

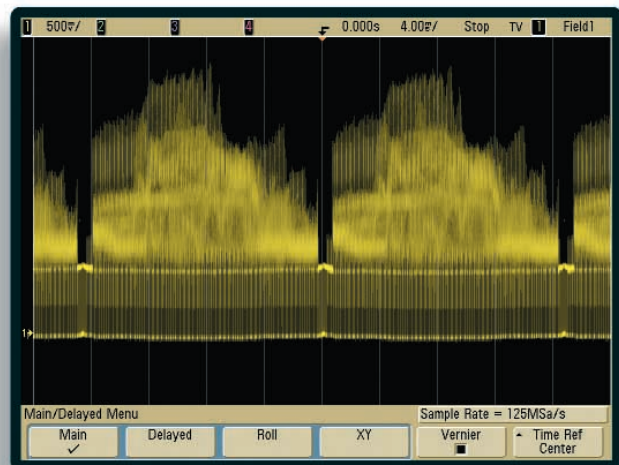
Advanced capabilities are only as good as a scope's fundamental measurement performance. With the bandwidth, sampling speed, memory depth, and channel count to bring your toughest problems into focus, the Agilent 6000 Series helps you apply this power with intuitive front-panel controls and versatile connectivity solutions.

High-definition color displays:

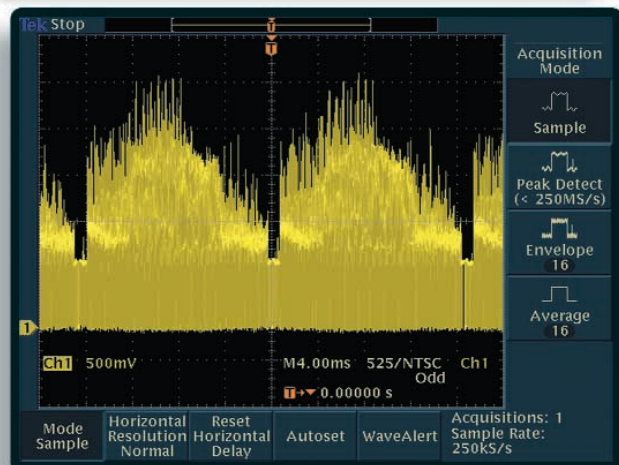
See the subtle details that most scopes can't show you

Ever get the feeling your current scope is hiding things from you? The Agilent 6000 Series combines MegaZoom deep memory with the exclusive high-definition color display system to reveal those subtle details you've been missing all along. The deep memory is mapped into 256 levels of intensity on a high-resolution XGA display with a phenomenal update rate of up to 100,000 waveforms per second.

Single-shot acquisitions on a composite video signal



Agilent MSO6034A XGA color display (1024 x 768)



Tektronix TDS3052B VGA color display (640 x 480)

MegaZoom III deep memory:

Unparalleled signal capture

Long, non-repeating signals are among the hardest to nail down; the smaller the scope's memory, the less signal you see. Agilent offers the most memory of any scope in this performance class.

The Agilent 6000 Series with MegaZoom III technology offers the highest real time waveform update rate in its class coupled with a high resolution display and 256 color intensity grades. With 1 Mpts standard memory and optional expansion up to 8 Mpts (that's 800 times deeper than the Tektronix TDS 3000B Series), now you can finally capture those elusive signals at high sample rates. And unlike dedicated deep-memory scopes, Agilent MegaZoom is not some complicated, special mode with sluggish response. It's always on, always fast, and always there to help you capture the most critical signals.

Advanced triggering:

Isolate and analyze complex signals and conditions

You can't measure it if you can't find it. Flexible triggering lets you easily isolate and analyze the complex signals and faults common in embedded systems. I²C, CAN, LIN, USB, and SPI serial bus triggering and TV triggering (including analog HDTV) all come standard. Plus, you can define sequence, pattern, pulse width and filters to zero in with unmatched precision.

Agilent MSO6052A

Full-scale connectivity:

No scope is an island in today's interconnected labs

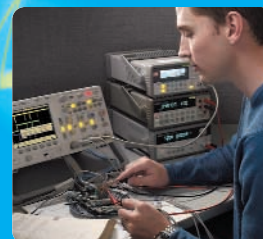
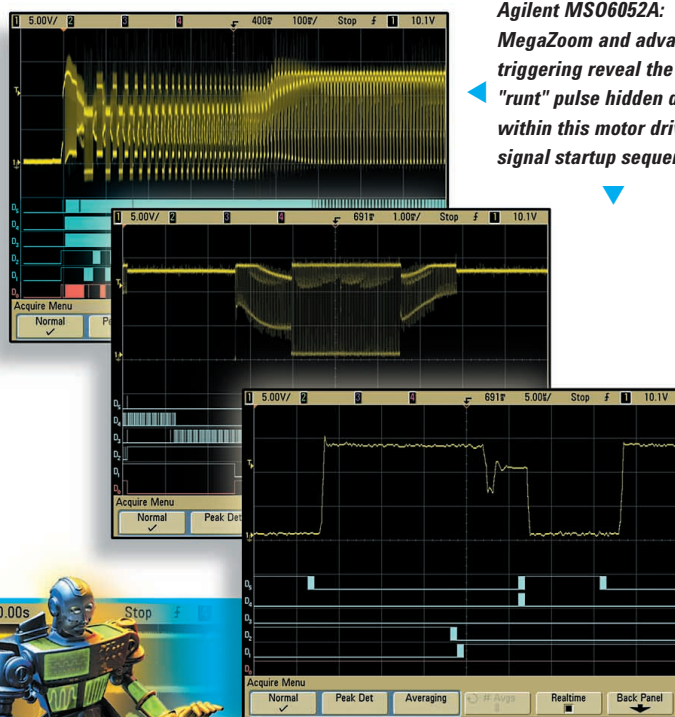
Whether it's printing measurement plots, transferring data to a PC, quickly automating ad hoc test routines, or exporting data to your statistics software, today's oscilloscopes need to connect with a wide variety of PCs, networks, and peripheral devices. Old-school interfaces such as RS-232 and parallel simply won't cut it anymore. Agilent 6000 Series scopes come standard with 10/100 Mbps Ethernet, GPIB and high-speed USB2.0 interfaces, so you can choose the ideal interface for every connectivity need. In addition, you'll find a USB port on the front panel for easy data storage to USB flash drives.

Mixed-signal analysis:

Find out what's happening in the other 80% of your circuit

If your designs follow today's increasing trend of mixed analog and digital content, you already know how hard it can be to test these circuits with a conventional scope. Even a four-channel scope isn't much help if you have a dozen or more related signals that require simultaneous capture. From ADCs and DACs to DSPs, FPGAs and embedded microcontrollers, the unique 2+16 and 4+16 scope/logic combinations of Agilent mixed signal oscilloscopes give you the channel counts you need to test contemporary electronic designs.

Agilent MSO6052A:
MegaZoom and advanced triggering reveal the "runt" pulse hidden deep within this motor drive signal startup sequence.



Ready to see for yourself?

The proof is in the performance, and there's no better way to prove the superiority of the new Agilent 6000 Series scopes than seeing one in action on your bench, measuring your circuits. Contact Agilent today to request an evaluation.

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Agilent 6000 Series Oscilloscopes



Model	Band-width	Maximum sample rate	Memory	Channels	Other standard features
DSO6032A	300 MHz	2 GSa/s	MegaZoom III memory 1 Mpts standard, 2 Mpts and 8 Mpts optional	2	<ul style="list-style-type: none">• Dedicated controls for each channel• Autoscale• Automatic and cursor measurements• Front panel USB port• Built-in help• Infiniium AutoProbe interface• Built-in storage compartment
MSO6032A				2 + 16	
DSO6034A				4	
MSO6034A				4 + 16	
DSO6052A*	500 MHz	4 GSa/s		2	
MSO6052A*				2 + 16	
DSO6054A*				4	
MSO6054A*				4 + 16	
DSO6102A*	1 GHz	4 GSa/s		2	
MSO6102A*				2 + 16	
DSO6104A*				4	
MSO6104A*				4 + 16	

* Maximum sample rate and memory are interleaved

Like to take a closer look?

View our new video demo online where you'll see a side-by-side comparison of the 6000 Series to traditional scopes, including the Tektronix TDS3000B Series.

A variety of measurement applications are shown demonstrating Agilent's exclusive display quality and waveform update rate when capturing complex-modulated signals and infrequent glitches.

See it today at www.agilent.com/find/scope-demo.

By internet, phone, or fax, get assistance with all your test & measurement needs.

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Other Asia Pacific Countries:

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(fax) (65) 6836 0252
Email: tm_ap@agilent.com

Product specifications and descriptions in this document subject to change without notice.
02/16/2005

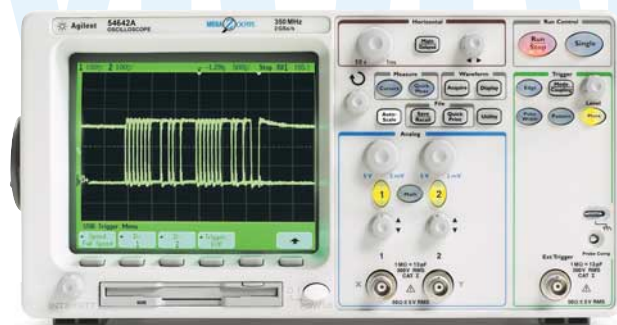
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Agilent Technologies

Comprehensive measurement tools at budget prices

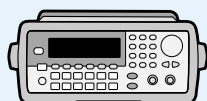
- **Troubleshoot complex designs with responsive MegaZoom deep memory**
- **Find subtle details that the typical scope won't show, thanks to a patented high-resolution display**
- **Capture elusive signals with powerful triggering**
- **Choose a compact, lightweight model for benchtop, field, or classroom settings**



Agilent's 54600 Series low-cost oscilloscopes give you a view into your system performance that is unmatched by any other portable oscilloscope. Features include bandwidths from 60 to 500 MHz, MegaZoom deep memory, advanced triggering, a high-definition display, and built-in help to let you easily focus on tough design challenges.

Selection Guide for Agilent 54600 Series Oscilloscopes

	54642A	54641A	54624A	54622A	54621A
Bandwidth	500 MHz	350 MHz	100 MHz	100 MHz	60 MHz
Channels	2	2	4	2	2
Maximum sampling	2 GSa/s	2 GSa/s	200 MSa/s	200 MSa/s	200 MSa/s
Maximum memory	8 M	8 M	4 M	4 M	4 M
MegaZoom	Yes	Yes	Yes	Yes	Yes
Special features	Ease-of-use features such as dedicated controls for each channel, autoscale, and built-in help keep you focused on your test, instead of your test tools. Each of these scopes has a full triggering feature set with serial triggers, pulse width, and TV. Automatic and cursor measurements provide critical waveform characterization. MegaZoom deep memory and Agilent's unique high-resolution display show you exactly how your circuit is performing.				
Description	The personal lab scope for professionals needing high-bandwidth measurements at an affordable price. MegaZoom allows high-fidelity viewing of your fastest signals while viewing a full cycle of the system.	With 350 MHz bandwidth and 1 ns rise time, this is the scope for high-speed applications on a limited budget. This is the lowest-cost deep-memory scope to offer 1 ns performance.	Four full channels of MegaZoom deep memory make this power electronics, electromechanical, and bio-physical applications. Each of the four channels has its individual dedicated control knobs for simplified operation.	The personal scope for professionals working with less than 50 MHz logic devices. Rich triggering and measurement capabilities make it an ideal lab scope for many applications.	Lowest-cost deep memory in the market. Ideally suited for electromechanical and education labs. Easily view your most demanding signals with MegaZoom and a high-resolution display.



Edit and replay signals captured on your new scope with IntuiLink data capture software and a versatile function/arbitrary waveform generator (page 8).



Call your local Agilent Direct office

More ways to debug tough analog and digital problems

- **View up to 20 time-aligned scope and timing channels simultaneously**
- **Save time with built in triggering for SPI, USB, I²C, LIN and CAN**
- **Troubleshoot mixed-analog and digital designs with responsive MegaZoom deep memory**
- **Increase debug power of mixed-signal models with new FPGA dynamic probe**



The increasing digital content in today's designs can make it difficult to capture enough channels simultaneously with a traditional 2- or 4-channel scope.

With the Agilent 54620/40 Series oscilloscopes, you can now capture, display and analyze a variety of signals in one acquisition on one instrument screen, helping

you focus more quickly on tough design problems. These 60 MHz to 1 GHz mixed-signal oscilloscopes seamlessly integrate a 16-channel timing analyzer so you can easily measure a combination of signal types and speeds all at once, including slow analog, fast digital, or baseband RF.

Selection Guide for Agilent Mixed-signal Oscilloscopes (MSO)

	54832D Infiniium*	54833D Infiniium*	54831D Infiniium	54830D Infiniium	54642D Portable	54641D Portable	54622D Portable	54621D Portable
Bandwidth	1 GHz	1 GHz	600 MHz	600 MHz	500 MHz	350 MHz	100 MHz	60 MHz
Channels scope+timing	4+16	2+16	4+16	2+16	2+16	2+16	2+16	2+16
Max. sampling	4 GSa/s	4 GSa/s	4 GSa/s	4 GSa/s	2 GSa/s	2 GSa/s	200 MSa/s	200 MSa/s
Max. memory	Up to 128 M	Up to 128 M	Up to 128 M	Up to 128 M	8 M	8 M	4 M	4 M
MegaZoom	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Special features	Infiniium's Windows® XP Pro-based interface gives you unparalleled ease of use for both scope and logic channels and the ability to run any Windows application inside the scope. Powerful triggering, measurements, and math functions make this the scope of choice for embedded applications. LAN and Web connectivity let you share information easily and control the scope remotely.				High-definition display with 32 shades of gray to give a clear analog-like view of critical waveforms. Familiar knob-based controls for both scope and logic channels helps you put these scopes to work right out of the box. Serial triggering simplifies tracking down CAN, I ² C, SPI, USB and LIN serial-bus problems. IntuiLink software simplifies PC connectivity.			
Description	For high-performance 32-bit embedded applications with high-speed logic	For embedded applications beyond the capabilities of 4-channel scopes	For 32-bit applications with logic; ~2 ns edge speeds and 4 scope channels	For DSP-based systems requiring extended analysis and deep memory	For higher-speed embedded and DSP applications	For medium-speed embedded applications up to 50 MHz	For 8- and 16-bit micro-controller applications	The lowest-cost MSO; ideal for education and industrial applications
Notes	Standard memory is 4 M, options extend up to 128 M. New jitter analysis options are available.				IntuiLink data capture software is provided at no cost. Scopes have built-in parallel and RS-232 I/O. GPIB is an extra-cost option.			

* Scope probes must be ordered separately.

Windows is a U.S. registered trademark of Microsoft Corporation.



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A more-effective approach to high-performance measurements

- *Simplify measurement set up with familiar Windows-based graphical interface and analog-like front panel*
- *Solve more problems in less time with a broad array of measurement and analysis tools*
- *Capture bursting signals with segmented acquisition mode and new deep memory – 128 Mpts*



With bandwidths up to 1 GHz, sample rates up to 4 GSa/s and memory depths up to 128 M points, Agilent Infiniium oscilloscopes combine ease-of-use and the right specifications with a broad feature set to help you get your job done faster.

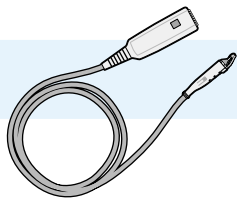
Exclusive MegaZoom memory technology gives you the speed and depth to capture a full cycle of your device's operation with enough resolution to view critical intervals of the highest speed signals. MegaZoom is available at all times and does not require a special operating mode.

For the ultimate in flexibility, you can also run Windows software applications inside the scope, thanks to its Windows XP Pro-based open platform.

Selection Guide for Agilent 5483x Series Infiniium Oscilloscopes

	54832B Infiniium*	54833A Infiniium*	54831B Infiniium	54830B Infiniium
Bandwidth	1 GHz	1 GHz	600 MHz	600 MHz
Channels	4	2	4	2
Max. sampling	4 GSa/s	4 GSa/s	4 GSa/s	4 GSa/s
Max. memory	Up to 128 Mpts	Up to 128 Mpts	Up to 128 Mpts	Up to 128 Mpts
MegaZoom	Yes	Yes	Yes	Yes
Special features	11 trigger modes isolate circuit problems. 14 voltage, 13 time measurements, 18 waveform math functions, 6 eye diagram measurements, and 8 histogram measurements allow full circuit characterization.			
Description	The scope for projects where edge speeds are in the nanosecond range. Four deep MegaZoom channels show all the details.	The lowest-cost 1 GHz scope in the market.	Four channels of standard 4 Mpts deep MegaZoom upgradable to 128 Mpts and Infiniium's ease of use bring your critical measurements into view.	When you need more than 500 MHz with the power of Infiniium at a budget saving price, this scope will fit your needs.
Notes	Standard memory is 4 M, except the 54833A which has 1 M. All models are upgradeable to 128 Mpts. E2699A My Infiniium software allows customization of all Infiniium models. New jitter analysis options are available.			

* Probes must be ordered separately.



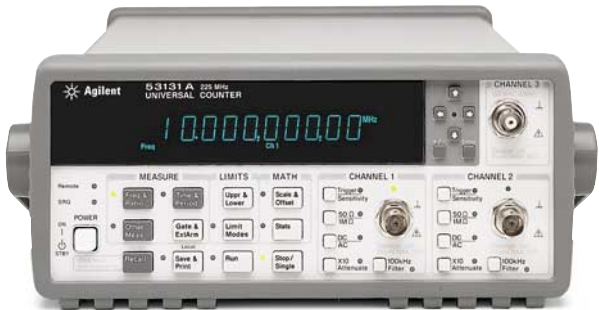
Measure the true signal with confidence using Agilent's wide bandwidth scope probes.



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Count on more precision,
more speed and more versatility

- *Frequency ranges up to 12.4 GHz*
- *High-throughput architecture delivers up to 200 measurements per second via GPIB*
- *Automated limit testing with graphical results*



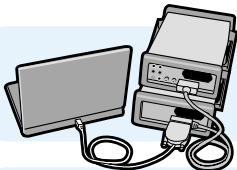
The Agilent 53131A/32A universal counters perform a wide variety of time and frequency measurements with the precision you need for design work and the speed you need for production work.

The 53131A offers 10 digits/sec frequency resolution and 500 ps time interval resolution up to 225 MHz on 2 channels (with optional 3, 5 or 12.4 GHz third channel). The 53132A offers the same measurement set and frequency coverage options with up to 12 digits/sec frequency resolution and 150 ps time interval resolution.

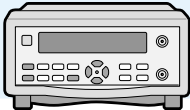
The value-priced Agilent 53181A RF frequency counter provides 10 digits/sec frequency resolution up to 225 MHz on one channel with an optional 1.5, 3, 5 or 12.4 GHz second channel.

Selection Guide for Agilent Frequency Counters and Time Interval Counter			
	53131A	53132A	53181A
Type	Universal (2 channel) ^[1]		RF (1 channel)
Measurements	Frequency, frequency ratio, time interval, period, rise/fall time, positive/negative pulse width, duty cycle, phase, totalize, peak voltage, time interval average, time interval delay		Frequency, frequency ratio (with optional ch. 2), period, peak voltage
Analysis	Automatic limit testing, math (scale and offset), statistics (minimum, maximum, mean, standard deviation)		
Frequency range (optional)	dc to 225 MHz (3, 5 or 12.4 GHz)	dc to 225 MHz (3, 5 or 12.4 GHz)	dc to 225 MHz (1.5, 3, 5 or 12.4 GHz)
Resolution (frequency, time interval)	10 digits/s, 500 ps	12 digits/s, 150 ps	10 digits/s, N/A
Software	Includes IntuiLink Data Capture connectivity software		

^[1] Channel 2 can only be used to make frequency, period, ratio, and voltage measurements – measurements on channel 1 and channel 2 are made sequentially.



Automate tests and ensure consistent setups by connecting to a PC with the low-cost USB/GPIB interface (page 16)



Need to take high-performance frequency measurements? Investigate the Agilent 53140 and 53150 Series counters.



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An endless variety of waveforms for every measurement challenge

- **Broad feature set and high-quality signals at unexpected prices**
- **10 waveforms, including pulse, pulse modulation and arbitrary**
- **THD less than 0.04% and flatness as low as ± 0.1 dB**
- **Graphical display simplifies waveform creation**

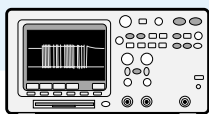


The Agilent 33220A and 33250A function/arbitrary waveform generators give you 10 standard waveforms and the ability to create versatile arbitrary waveforms, with a sample rate of 50 MSa/s (33220A), or 200 MSa/s (33250A). In addition, the 33220A and 33250A can generate pulse waveforms with variable-edge time.

Start with the signals a product is supposed to see, then add noise, harmonics, spurs and other extraneous signals to see how well it responds. Built-in modulation capabilities and both linear and log sweeps further expand your test possibilities without requiring additional generators.

Selection Guide for Agilent Function/Arbitrary Waveform Generators

	33220A	33250A
Frequency range (sine, square)	1 μ Hz to 20 MHz	1 μ Hz to 80 MHz
Standard waveforms	Sine, square, pulse, triangle, ramp, noise, sin(x)/x, exponential rise and fall, cardiac, dc volts	Sine, square, pulse, triangle, ramp, noise, sin(x)/x, exponential rise and fall, cardiac, dc volts
Pulse	5 MHz, variable edge time	50 MHz, variable edge time
Arbitrary waveforms	64 K points, 14 bits	64 K points, 12 bits
Sample rate	50 MSa/s	200 MSa/s
Modulation	AM, FM, PM, FSK, PWM, (all internal/external)	AM, FM, FSK, (all internal/external)
Sweep	Linear or logarithmic; up or down	Linear or logarithmic; up or down
Burst	Gated, N-cycle	Gated, N-cycle
External clock reference (Can also be used to create precise phase offsets or to phase-lock two generators)	Optional External lock range: 10 MHz \pm 500 Hz Internal frequency: 10 MHz	Standard External lock range: 10 MHz \pm 35 kHz Internal frequency: 10 MHz
Connectivity (IntuiLink Data Capture SW included)	GPIO, USB, LAN	GPIO, RS-232



Team your function generator with an Agilent scope (pages 4-6) and IntuiLink data capture software to capture, edit and replay test signals.



Call your local Agilent Direct office



Enhance your waveform superpowers by getting more from your function generator.

With the Agilent 33220A 20 MHz function/arbitrary waveform generator the powerful array of waveforms will expand your testing capabilities.

Basic and pulse signals

Activate sine and square waves up to 20 MHz. Produce linear and log sweeps. Output ramp, triangle, burst and noise signals. Generate pulses up to 5 MHz with variable period, pulse width and edge time.

Built-in modulation

Energize the internal modulation source to produce AM, FM and PM as well as FSK and even pulse-width modulation (PWM).

Arb capability and IntuiLink Software

Create arbitrary waveforms of 2 to 64 K points with 14-bit resolution and 50 MSa/s, or capture signals with a scope then edit and download the waveform with free IntuiLink data capture software.

Choice of interface

Plug in via GPIB, USB or LAN: all are standard, yet the price for the 33220A is still a value.

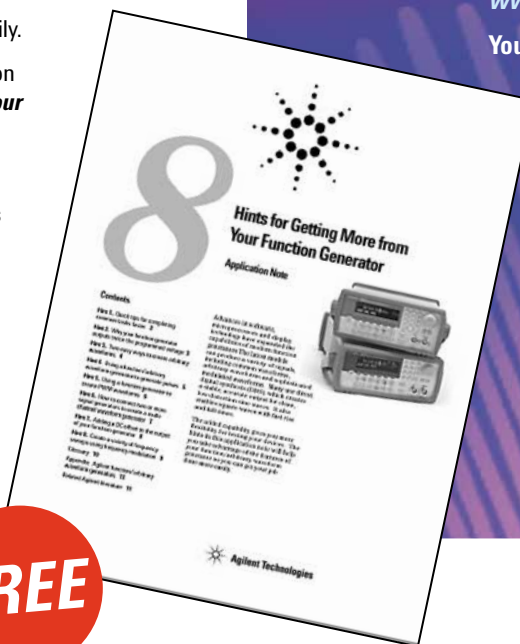
Because it's from Agilent, you know you can count on solid frequency stability and low distortion.

Get the most from your function generator's capabilities

That's why we're offering a few hints and tips that will help you do more with your generator, and finish your tests more easily.

They're collected in our latest application note, **"8 Hints for Getting More from Your Function Generator."**

1. Complete common tasks faster
2. Compensate for non-standard loads
3. Utilize two ways to create arb waveforms
4. Generate pulses and pulse trains
5. Create PWM waveforms
6. Synchronize two or more generators
7. Add larger DC offsets
8. Use FM to create versatile sweeps



FREE

To get your copy visit

www.agilent.com/find/direct1.

You can also see a five-minute

online video of the
Agilent 33220A
and download the
product data sheet.

More choices to meet your exact power needs

- **Programmable E363x supplies with 1, 2 or 3 outputs and power up to 200 W**
- **Affordable E36xx series manual supplies for everyday benchtop use**
- **Programmable E364x supplies with 1 or 2 outputs and power to 100 W**



Agilent's affordable DC power supplies deliver quiet, stable power for both manual and automated tests in R&D and manufacturing environments.

E363x Series Programmable DC Power Supplies

- **80 to 200 W output**
- **Standard GPIB and RS232 connectivity**
- **Triple-output model for more power options**

	E3631A	E3632A	E3633A	E3634A
GPIB	Yes	Yes	Yes	Yes
# outputs	3	1	1	1
# ranges	1	2	2	2
DC outputs	25 V, 1 A -25 V, 1 A 6 V, 5 A	15 V, 7 A 30 V, 4 A	8 V, 20 A 20 V, 10 A	25 V, 7 A 50 V, 4 A
Ripple and noise	<350 μ Vrms, <2 mVpp		<350 μ Vrms, <3 mVpp	<500 μ Vrms, <3 mVpp
Power	80 W	120 W	200 W	200 W

E36xx Series Manual DC Power Supplies

- **Just the power you need, up to 120 V and 6 A**
- **30 to 60 W; single, double and triple outputs**
- **Dual range models for added flexibility**

	E3610A	E3611A	E3612A	E3614A	E3615A	E3616A	E3617A	E3620A	E3630A
# outputs	1	1	1	1	1	1	1	2	3
# ranges	2	2	2	1	1	1	1	1	1
DC outputs	8 V, 3 A or 15 V, 2 A	20 V, 1.5 A or 5 V, 0.85 A	60 V, 0.5 A or 120 V, 0.25 A	8 V, 6 A	20 V, 3 A	35 V, 1.7 A	60 V, 1 A	25 V, 1 A 25 V, 1 A	6 V, 2.5 A 20 V, 0.5 A -20 V, 0.5 A
Ripple and noise	<200 μ Vrms, <2 mVpp			<200 μ Vrms, <1 mVpp				<350 μ Vrms, <1.5 mVpp	
Power	30 W	30 W	30 W	48 W	60 W	60 W	60 W	50 W	35 W



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ORF MODELS

E364x Series Programmable DC Power Supplies

- Higher output levels in low-cost packages
- Wide array of models help you find an ideal match
- Standard GPIB and RS232 connectivity

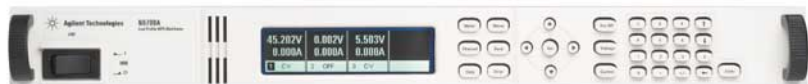


	E3640A	E3641A	E3642A	E3643A	E3644A	E3645A	E3646A	E3647A	E3648A	E3649A
GPIB	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# outputs	1	1	1	1	1	1	2	2	2	2
DC outputs	8 V, 3 A or 20 V, 1.5 A	35 V, 0.8 A or 60 V, 0.5 A	8 V, 5 A or 20 V, 2.5 A	35 V, 1.4 A or 60 V, 0.8 A	8 V, 8 A or 20 V, 4 A	35 V, 2.2 A or 60 V, 1.3 A	8 V, 3 A or 20 V, 1.5 A	35 V, 0.8 A or 60 V, 0.5 A	8 V, 5 A or 20 V, 2.5 A	35 V, 1.4 A or 60 V, 0.8 A
Ripple and noise	<0.5 mVrms, <5 mVpp	<1 mVrms, <8 mVpp	<0.5 mVrms, <5 mVpp	<1 mVrms, <8 mVpp	<0.5 mVrms, <5 mVpp	<1 mVrms, <8 mVpp	<0.5 mVrms, <5 mVpp	<1 mVrms, <8 mVpp	<0.5 mVrms, <5 mVpp	<1 mVrms, <8 mVpp
Power	30 W	30 W	50 W	50 W	80 W	80 W	60 W	60 W	100 W	100 W

Conserve valuable rack space with 1U high-density power

- N5700 series: 24 models from 750 to 1500 W for basic power applications
- N6700 series: low-profile modular power system for system optimization

Get all the power your automated tests require, without wasting precious rack space. Agilent N5700 series system DC supplies deliver up to 1500 W in a 1 U package. For the ultimate in flexibility, the N6700 modular power systems let you mix and max power capabilities as your needs evolve.



	N5700	N6700
GPIB, LAN, USB	Yes	Yes
# outputs	1	Up to 4
V-range	Up to 600 V	Up to 100 V
I-range	Up to 180 A	Up to 20 A
Ripple-rms	As low as 8 mV	As low as 1 mV
Power	750 W and 1500 W	Up to 100 W per output



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Connect instruments to a PC in a fraction of the time

- ***New on instruments: standard PC I/O (LAN and USB)***
- ***New freedom: use your favorite programming language***
- ***New software tools to help you set up in minutes***
- ***New developer resources***
- ***Code examples***

Connecting PCs with test instruments no longer needs to be a time-consuming nightmare of incompatible hardware and software. For the first time, Agilent Open combines all the elements you need to quickly connect instruments from multiple vendors with speed and confidence.

Support for your favorite software environments

Agilent Open lets you choose the approach that works best for you, whether it's a standard language such as C# or Visual Basic or a graphical environment such as Agilent VEE (see page 17).

Standard PC I/O

Run an instrument directly via LAN or USB, for the ultimate combination of versatility and speed.

New system-ready instruments

Smaller, faster instruments offer the simplicity of USB and the speed and reach of LAN connectivity.



LAN

Connect a laptop to one of our new system-ready instruments directly via native LAN.

GPIO

Want to connect a GPIO instrument to the PC's USB port? It's no problem, with one of our many I/O converters (see page 16).

System Developer Guide

Receive our ongoing series of application notes and information to help you simplify system design. By signing up for the System Developer Guide, you'll also have the chance to ask test-system experts questions on your application, and receive FAQs from your peers.

Sign up today at www.agilent.com/find/direct1.



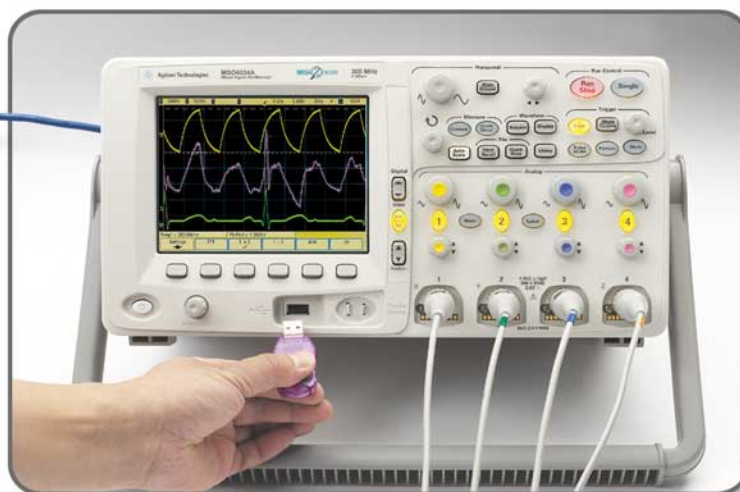
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Combining system-ready instruments, open software and standard PC I/O, Agilent Open means the freedom to choose the tools you want to use—and the assurance they'll work together, quickly and easily.

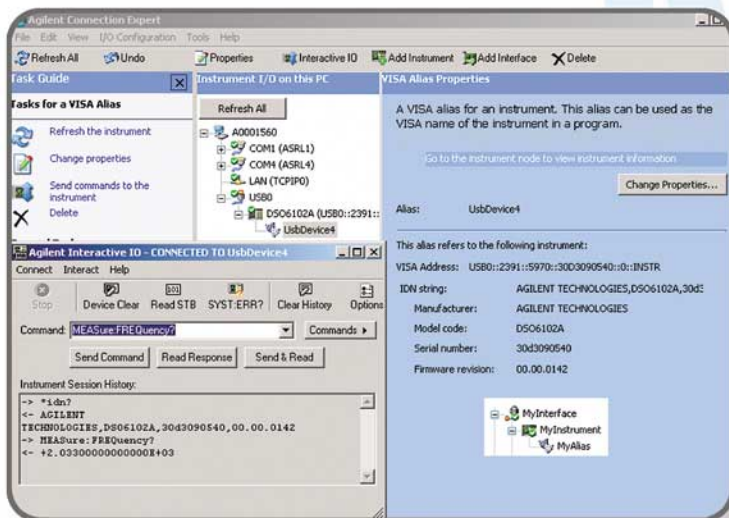
LAN
*Measure from afar,
directly via LAN*

Seeing is believing

The new Agilent 6000 Series oscilloscope (right) has native USB and LAN connections as well as GPIB to make programming easy.



The Agilent 6000 Series can directly download screen waveforms to a USB thumb drive (see supplement insert).



The IO Libraries Suite 14 is vendor neutral. It helps you configure and connect instruments, regardless of interface type or instrument vendor.

New IO Libraries Suite 14

Add PC control in minutes instead of hours or days. Monitor I/O traffic. Discover and validate instrument connections automatically. Quickly start your project with example programs (see page 17).



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See why more engineers count on Agilent multimeters for accuracy and performance

- **34401A:** 6½ digits of resolution at a 5½ -digit price
- **3458A:** up to 8½ digits of resolution, up to 100,000 readings per second
- **34420A:** nanovolt sensitivity with 7½ -digit precision
- **34970A:** 6½ digits of resolution, scan rates of up to 250 channels/second



Agilent digital multimeters let you measure with laboratory accuracy at production-line speed. Count on dependable results and convenient features that minimize test and troubleshooting times.

34401A digital multimeter, 6½ digit: 1-year accuracy of 0.0035% for dc volts and 0.06% for ac volts. One or two button presses give you functions from dc volts

to frequency to dB and dBm. Advanced tests include limit checks, min/max/avg readouts and dc voltage ratios.

3458A digital multimeter, 8½ digit: up to 100,000 readings, 110 autoranges and more than 340 setup changes per second. 24-hour accuracy is 0.6 ppm for dc volts, 2.2 ppm for resistance, and 100 ppm for mid-band ac volts.

34420A nanovoltmeter, 7½ digit: optimized for precision low-level measurements, with 7½ digit resolution and 1.3 nVrms/8 nVp-p noise performance.

34970A data acquisition switch unit, 6½ digit: three-slot mainframe with a built-in 6½ digit DMM and eight optional plug-in modules (see page 9).

Selection Guide for Agilent Digital Multimeters

	34401A	3458A	34970A ⁽¹⁾	34420A
Type	DMM 6½ Digit	DMM 8½ Digit	Data logger/scanning DMM 6½ Digit	Nanovolt / micro-ohm meter 7½ Digit
Basic measurements	dc & ac voltage, dc & ac current, 2 & 4 wire resistance, frequency & period			dc voltage, 2 & 4 wire resistance, low power resistance, ratio
Additional measurements	Continuity, diode test	3 modes of true RMS, digitizing	Scanning 20 to 60 2-wire channels	2 channels – ratio and difference
Temperature	N/A	Thermistor, RTD	Thermocouple, RTD, thermistor	Direct SPRT, RTD, Thermistor, thermocouple
dcV accuracy⁽²⁾ ±(% of reading + % of range)	0.0035 + 0.0005	0.0008 + 0.000005 (.0004 + .000005) ⁽³⁾	0.0035 + 0.0005	0.003 + 0.0004
acV accuracy⁽⁴⁾ ±(% of reading + % of range)	0.06 + 0.03	0.007 + 0.002	0.06 + 0.04	N/A
Resistance accuracy⁽⁵⁾ ±(% of reading + % of range)	0.010 + 0.001	0.0010 + 0.00005	0.010 + 0.001	0.006 + 0.0002
Math functions	Null, statistics, dBm, dB, limit test	Null, statistics, dBm, dB, limit test, scale, offset, filter, % error	Null, statistics, limit test, scale, offset	Null, statistics, dBm, dB, limit, test, scale, offset, filter, moving avg. filter

⁽¹⁾ Requires plug-in modules; 34970A has three slots and 8 modules to choose from (34901A, 34902A, 34903A, 34904A, 34905A, 34906A, 34907A, 34908A)

⁽²⁾ dcV accuracy; 1 yr, 10 V range

⁽³⁾ dcV accuracy with optional high stability reference (option 3458A-002)

⁽⁴⁾ acV accuracy; 1 yr, 10 V range, 10 Hz to 20 kHz, (3458A 40 Hz to 1 kHz)

⁽⁵⁾ Resistance accuracy; 1 yr, 4 wire-ohm, 100 kΩ range, (34420A 10 kΩ range)



Call your local Agilent Direct office

All the speed, resolution and flexibility you need for data acquisition challenges

- **Universal inputs measure 11 different functions without signal conditioning**
- **6½ digits (22 bits) of resolution**
- **Scan rates up to 250 channels/second**
- **Free software to configure and control tests, display results and transfer data**



The Agilent 34970A combines a three-slot mainframe with a built-in 6½ digit DMM. Choose from eight optional plug-in modules to create a compact data logger, full-featured data acquisition system or low-cost switching unit—and reconfigure it as your needs evolve.

No matter what configuration you choose, you'll get the performance of a real data acquisition system for the price of PC plug-in cards.

The universal inputs solve all the headaches of signal connection, setting up every channel and selecting the right display units for you.

On-module screw-terminal connections eliminate the need for terminal blocks, and a unique relay maintenance feature counts every closure on every switch for easy, predictable relay maintenance.

Selection Guide for Agilent 34970A Data Acquisition Control Unit Module

	Description	Speed (ch/sec)	Max voltage	Max current	Comments
34901A	20-ch. multiplexer (2/4-wire)	60	300 V	1 A	2 current channels (22 ch. total); built-in cold junction reference; connects to internal DMM
34902A	16-ch. multiplexer (2/4-wire)	250	300 V	50 mA	Built-in cold junction reference; reed relays multiplex inputs to internal DMM
34903A	20-ch. actuator/GP switch	120	300 V	1 A	Form C (SPDT) switches; no connection to internal DMM
34904A	4x8 matrix	120	300 V	1 A	2-wire, full crosspoint; no connection to internal DMM
34905A	2-GHz dual 1:4 RF mux, 50 Ω	60	42 V	0.7 A	1-GHz through provided BNC-to-SMB adapter cables; no connection to internal DMM
34906A	2-GHz dual 1:4 RF mux, 75 Ω	60	42 V	0.7 A	1-GHz through provided BNC-to-SMB adapter cables; no connection to internal DMM
34907A	Two 8-bit digital I/O ports 26-bit, 100-kHz event counter Two 16-bit analog outputs	N/A	42 V 42 V ±12 V	400 mA 10 mA	Open drain Gated, selectable input threshold; Earth referenced; calibrated; no connection to internal DMM
34908A	40-ch. single-ended multiplexer	60	300 V	1 A	Common low, no 4-wire measurements; built-in cold junction reference; connects to internal DMM
34970A	Data Acquisition/Switch Unit. Three-slot mainframe with internal 6½ digit DMM. GPIB, RS-232 and 50 K reading non-volatile memory with timestamp. Includes BenchLink Data Logger II software.				



Looking for an ATE-class switch/measurement unit without the cost or complexity of PXI and VXI? Check out the new Agilent 34980A.



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Connect and automate in three fast, easy steps

With these accessories and software tools, it's easy to connect, configure and automate.

Which interface is best for you?

Choose your instrument and computer interfaces, then select the optimum converter.

USB: ease and convenience

LAN remote system configuration






GPIB: highest throughput

RS-232: compatibility with older instruments

1
STEP

Choose your interfaces

To protect your investment in existing equipment, you can continue to mix and match virtually any combination of instruments and interfaces.

From Instrument...	to Converter...	to PC
GPIB	Agilent 82357A USB/GPIB interface	USB
		
RS-232	Agilent E5805A USB/4-port RS-232 interface	USB
		
GPIB	Agilent E5810A LAN/GPIB gateway	LAN
		
USB	Agilent E5813A networked 5-port USB hub	LAN
		
GPIB	Agilent 82350B high performance GPIB card	PCI
		



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CHOICES

STEP 2

Find and configure your instruments

The Agilent IO Library Suite quickly and easily helps you establish a connection with your instruments. In little time, configure and program your instruments by choosing from 100s of example programs, written in a variety of programming languages.

This timesaving software can be downloaded from the URL referenced below.



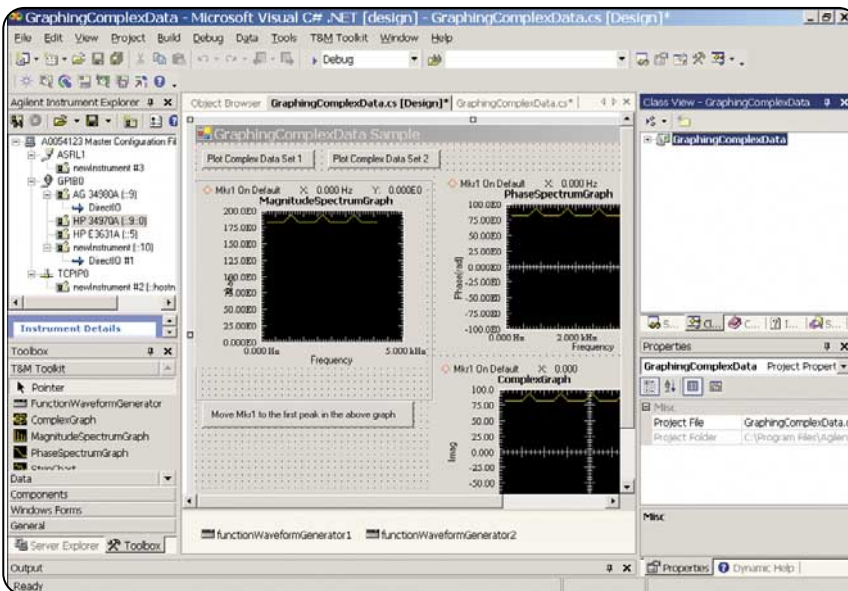
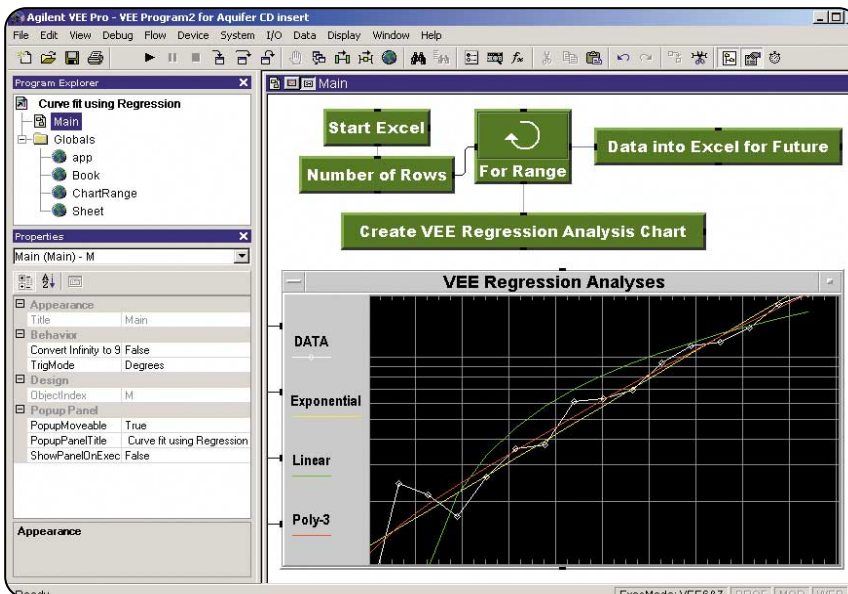
Agilent IO Libraries task guide and instrument tree view

STEP 3

Select the optimum test software for your needs

No matter what your preference—graphical or textual—or whether you need a test sequencer or just a few commands to an instrument, Agilent has a solution to help you.

Get a free 30-day evaluation copy of VEE Pro or T&M Toolkit, and download a copy of the IO Library Suite at www.agilent.com/find/direct1.

Agilent VEE Pro for intuitive graphical programming.**Textual programming with T&M Toolkit for Visual Studio®.NET**

Visual Studio is a registered trademark of Microsoft Corporation in the United States and/or other countries.

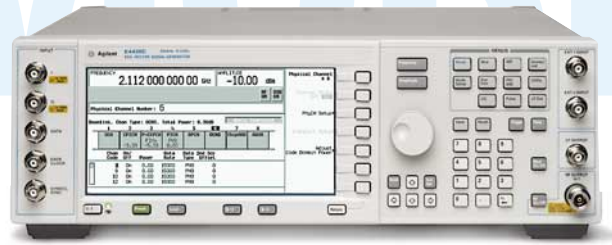


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Handle today's standards with ease— and be ready for tomorrow's

- **Internal arbitrary I/Q waveform playback (up to 100 MSa/s)**
- **Internal real-time I/Q symbol generation (up to 50 Msym/s)**
- **Signal creation software: custom modulation, enhanced multitone, and more**
- **High spectral purity of -134 dBc (@ 1 GHz)**



The Agilent E4438C ESG vector signal generator provides excellent analog performance in level accuracy, output power and spectral purity on signals up to 6 GHz. A wide range of modulation formats and a highly configurable architecture make the E4438C ideal for design, manufacturing and troubleshooting applications.

The E4438C sets a new level of performance by offering exceptional baseband signal generation operation. The built-in arbitrary waveform and real-time baseband generators provide wide RF modulation bandwidth, fast sample rate, and large waveform memory which are key for evaluating the performance of broadband communication systems and components.

Its digital modulation capabilities (PSK, QAM, FSK and MSK) include a comprehensive array of standards-based formats.

Plus, you can team the E4438C with the new Baseband Studio products to expand the tool set even more, with fading, waveform streaming, digital I/Q outputs and other features.

Agilent E4438C ESG Vector Signal Generator

Frequency range	250 kHz to 1, 2, 3, 4, 6 GHz
Output power	+17 to -136 dBm
Level accuracy	±0.5 to 1.5 dB
SSB phase noise (20 kHz offset)	-134 dBc (at 1 GHz)
Harmonics	< -32 dBc
Spurious	< -62 to < -80 dBc
Switching speed	< 9 ms
Jitter (@ 622 MHz, 5 MHz BW)	33 pUI
Built-in dual channel arbitrary waveform generator	80 MHz BW, 16-bit, 100 Msa/s rate, 64 Msa/s memory
Built-in function generator	Sine, square, ramp, triangle, pulse, noise waveforms
Modulation formats	AM, FM, ϕ M, pulse, PSK, QAM, FSK, MSK and standards-based formats such as WLAN (802.11a/b/g), GSM, EDGE, GPRS and more
Additional features	<ul style="list-style-type: none"> - Enhanced multitone - AWGN calibrated noise - Pulse building - Noise power ratio - LAN connectivity - Digital I/O inputs and outputs with Baseband Studio digital signal interface module - Compatible with Baseband Studio for waveform streaming - Compatible with Baseband Studio for fading



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Faster measurements with high-integrity results

- **Robust specifications and background alignment ensure accurate measurements**
- **Segmented sweep and other unique features accelerate your measurements**
- **Fast warm-up and simpler operation get you productive in a hurry**



The Agilent ESA express analyzers offer three solution-focused configurations that simplify the configuration and ordering process. You'll get faster delivery, favorable prices, and the best overall value. Or, you can customize the ESA to meet your specific needs.

Basic: The ESA-L Series provides basic spectrum analysis with both accuracy

and the speed of 4 ms RF sweeps. For fieldwork, the portable analyzers have a weather-resistant front panel that allows operation in rain and high humidity.

Standard: The ESA-E Series with FM demodulation, 1 Hz RBW filters, and 50 ns zero span sweep times provides excellent value. With an expanded set of built-in functions and the most complete set of

documented specifications, you have a solution that will lead to improved DUT performance.

Communications: Expand on the standard functionality with the addition of built-in digital demodulation hardware. Use the communication-focused personalities to make the ESA a powerful tool for the development of communications devices and systems.

Agilent ESA Series Express Analyzers			
	Basic analyzer (Opt BAS) E4411/03/08B	Standard analyzer (Opt STD) E4402/04/05/07B	Communication test analyzer (Opt COM) E4402/04/05/07B
Frequency range	9 kHz to 1.5, 3.0 or 26.5 GHz	9 kHz to 3.0, 6.7, 13.2, 26.5 GHz	9 kHz to 3.0, 6.7, 13.2, 26.5 GHz
Speed			
Sweep time (< 3 GHz)	4 ms to 4000 s	1 ms to 4000 s	1 ms to 4000 s
Zero span sweep	4 ms to 4000 s	50 ns to 4000 s	25 ns to 4000 s
Warm up time	5 min	5 min	5 min
Dynamic range			
Resolution bandwidth (Option 1DR)	100 Hz to 5 MHz	10 Hz to 5 MHz 1 Hz with Option 1D5	1 Hz to 5 MHz
Measurement range (Option 1DR)	-130 dBm to +30 dBm	-140 dBm to +30 dBm -156 dBm with Option 1DS	-150 dBm to +30 dBm -167 dBm with Option 1DS
TOI	+7.5 dBm	+16 dBm	+16 dBm
Accuracy			
Frequency accuracy	±101 Hz	±101 Hz	±101 Hz
Span accuracy	±0.5%	±0.5%	±0.5%
Amplitude accuracy	±1.1 dB	0.4 dB	0.4 dB
Available measurement applications	Cable TV	Noise figure, phase noise, cable fault, cable TV	Flexible demodulation with 89601A software, modulation analysis, GSM/EDGE, cdmaOne, noise figure, phase noise

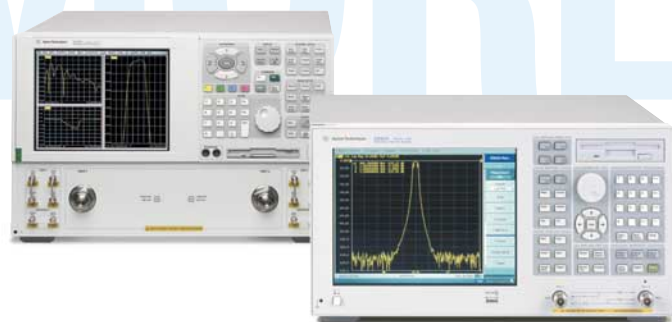


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Comprehensive tools to make more measurements in less time

- **Visual Basic automation to simplify routine test procedures**
- **Optional electronic calibration to boost measurement speed and accuracy**
- **Economical solutions for demanding measurement challenges**
- **Flexible connectivity via LAN, USB and GPIB**



The Agilent ENA-L RF and microwave network analyzers improve your measurement productivity with powerful features at affordable prices.

For RF applications up to 3 GHz, the ENA-L offers all of the critical performance needed in R&D, manufacturing, and

service to test RF components such as filters, amplifiers, antennas, cables, and CATV components. Choose S-parameter or transmission/reflection test sets and 50 or 75 ohm test port impedance.

For microwave applications up to 50 GHz, the PNA-L offers the perfect balance of

value and performance. With measurement speeds as fast as 9 μ s per point and up to 32 independent channels, the PNA-L offers the power and flexibility to satisfy your R & D or manufacturing requirements and reduce your cost of test.

Selection Guide for Agilent ENA-L (E5061A/62A) Network Analyzers

Frequency range	300 kHz to 1.5, 3 GHz
System dynamic range at test port	115 dB up to 3 GHz
Power at test port	-15 to +10 dBm without attenuator, -45 to +10 dBm with attenuator (Option 250, 275, or 1E1)
Trace noise	0.005 dB rms (1 MHz to 3 GHz)

NOTE: For more demanding measurement and application needs, Agilent offers higher performance ENA and PNA models. They are ideal for advanced applications such as balanced, pulsed-RF, and millimeter-wave measurements.



Making power measurements faster and more affordable

- **Measurement throughput up to 200 readings/second via GPIB**
- **Simple operation via uncluttered front panel**
- **Optional battery operation for field use**
- **Faster range switching accelerates tests**
- **Affordable solution for CW and average power measurements**



Selection Guide for Agilent EPM Series Power Meters

Model No.	No. of channels	Frequency range ⁽¹⁾	Power Range ⁽¹⁾				Measurement speed with E-Series sensors	Standard interfaces
			E-Series E9320 sensors	E-Series E9300 sensors	E-Series CW sensors	8480 Series sensors		
E4418B	1	9 kHz to 110 GHz	N/A	-60 dBm to +44 dBm	-70 dBm to +20 dBm	-70 dBm to +44 dBm	Up to 200 readings/sec	GPIB, RS-232 and RS-422
E4419B	2	9 kHz to 110 GHz	N/A	-60 dBm to +44 dBm	-70 dBm to +20 dBm	-70 dBm to +44 dBm	Up to 100 readings/sec on each channel	GPIB, RS-232 and RS-422

⁽¹⁾ Sensor dependent

Advanced capabilities for advanced power measurements

- **Accurate, repeatable power measurements for wireless, wireless networking, and radar applications**
- **Included PC software for power and statistical analysis**
- **High throughput—up to 1,000 corrected readings/second via GPIB**
- **Compatible with all Agilent 8480 and E-series sensors**
- **4 independent time gates**



Selection Guide for Agilent EPM-P Series Power Meters

Model No.	No. of channels	Frequency range ⁽¹⁾	Power Range ⁽¹⁾				Measurement speed with E-Series sensors	Standard interfaces
			E-Series E9320 sensors	E-Series E9300 sensors	E-Series CW sensors	8480 Series sensors		
E4416A	1	9 kHz to 110 GHz	-65 dBm to +20 dBm	-60 dBm to +44 dBm	-70 dBm to +20 dBm	-70 dBm to +44 dBm	Up to 1,000 readings/sec with E9320 sensors	GPIB, RS-232 and RS-422
E4417A	2	9 kHz to 110 GHz	-65 dBm to +20 dBm	-60 dBm to +44 dBm	-70 dBm to +20 dBm	-70 dBm to +44 dBm	Up to 1,000 readings/sec with E9320 sensors	GPIB, RS-232 and RS-422

⁽¹⁾ Sensor dependent



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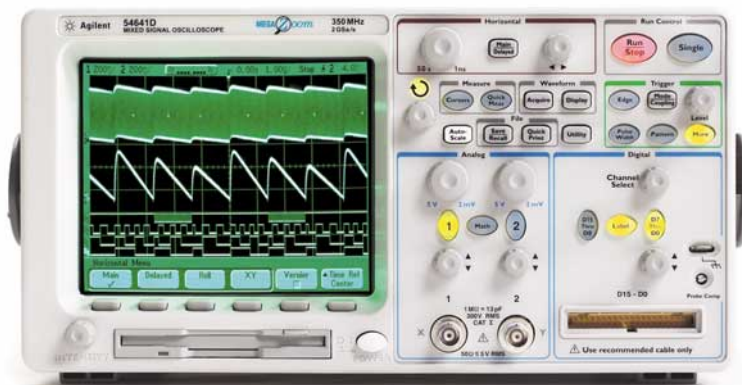
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